



Evaluation #

200821-O  
(Replaces 200310-O)

Safety & Buildings Division  
201 West Washington Avenue  
P.O. Box 2658  
Madison, WI 53701-2658

## Wisconsin Building Products Evaluation

Material

Lab Waste<sup>™</sup>  
CPVC Corrosive Waste  
Drainage System

Manufacturer

Spears Manufacturing Company  
15853 Olden Street  
Sylmar, CA 91342

### SCOPE OF EVALUATION

**GENERAL:** This report evaluates LabWaste<sup>™</sup> CPVC Corrosive Waste Drainage Systems, a total system consisting of pipe, fittings, solvent cement and additional supplemental equipment (i.e., neutralization tanks, holding tanks, etc.), manufactured by Spears Manufacturing Company. **This evaluation specifically addresses the CPVC corrosive waste pipe, fittings and solvent cement for use within an air plenum as a finished product.**

This review includes the cited **International Mechanical Code (IMC)** requirements below in accordance with the current **Wisconsin Amended IMC Code:**

- **Materials Exposed Within Plenums:** The LabWaste<sup>™</sup> CPVC Corrosive Waste Drainage Systems was evaluated in accordance with the requirements of **s. IMC 602.2.1.**

### DESCRIPTION AND USE

Spears® LabWaste<sup>™</sup> CPVC Corrosive Waste Drainage System: consist of fittings, pipe, solvent cement, with additional supplemental equipment that is chemical and corrosion resistant. Produced to ASTM Standards in DWV drainage patterns, uses solvent cement welding as a joining method, is suitable for use to 210° F, and meets 25/50 flame spread/smoke development required for air plenum installations when tested as a finished product.

**Material, Joining Method & System Integrity:** Chlorinated Polyvinyl Chloride (CPVC), a chemical and corrosion resistant thermoplastic that is structurally stable, heat resistant, and joined by solvent cement welding as a method of pipe and fitting connection. CPVC is serviceable to 210° F in non-pressure applications. Spears® LabWaste<sup>™</sup> system consists of CPVC thermoplastic pipe, fittings, and solvent cement. Interface of pipe, fittings and solvent cement has been engineered as an integral package to assure proper component compatibility and maximum system integrity.

## TESTS AND RESULTS

Spears® LabWaste™ CPVC Corrosive Waste Drainage System is certified by NFS International as a Special Engineered (SE) product for corrosive waste end use (NSF-cw S.E.). The SE program establishes performance criteria for a product from applicable portions of existing ASTM standards where an individual ASTM standard for the product does not exist. A special engineered specification is established to specify the design of an SE product and the requirements that must be attained to insure the SE product is at least equivalent (in terms of strength, quality, effectiveness, durability, and safety) to standardized product having similar end-use.<sup>1</sup> The “NSF-cw” certification listing is used where NFS third-party approval has been made for Polypropylene (PP) Polyvinylidene Fluoride (PVDF) corrosive waste systems currently manufactured.

SE certification is made to the manufacturer’s specifications and to the applicable portions of ASTM F1412, *Standard Specification for Polyolefin Pipe and Fittings for Corrosive Waste Drainage Systems*, as specified in the, *Specification for a Special Engineered (SE) Product*, as summarized in **Table 1**. Spears® LW-5 One Step CPVC Solvent Cement for use with LabWaste™ is certified by NFS International to ASTM F493, *Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings*. Conformance to these requirements is routinely monitored and tested by NFS. Additional industry evaluation of chemical resistance in accordance with ASTM test protocol is shown in **Table 3**.

Fitting configurations are produced to applicable DWV patterns of ASTM D3311, *Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fitting Patterns*, and various specialty patterns as required by the specification. All drainage fittings with 90° angles (sanitary tees, elbows, etc.) have socket pitch to maintain approximately 1/4" per foot drainage.

Spears® LabWaste™ CPVC Corrosive Waste Drainage System has been independently evaluated by UL/ULC for flammability of material and has received third-party evaluation of surface burning characteristics of flame spread and smoke development as a finished product, as shown in **Table 2**.

Table 1: Summary of Applicable Conformance Standards

Conformance Criteria	Applicable Standard	Standard Specification or Practice Title
Product Certification <sup>2</sup> (3 <sup>rd</sup> party approval to criteria specified below)	NFS Standard 14 Special Engineered (SE) product certification for corrosive waste end use.	Standard 14: <i>Plastic Piping System Components and Related Material</i> NSF-cw S.E. Certified to specified conformance standards & specifications.
Material	D1784, cell class 23447 (CPVC)	D1784: <i>Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds</i>
Dimensions and Tolerances – Pipe Dimensions and Tolerances – Fittings Chemical Resistance Adjusted concentrations for CPVC <sup>3</sup> Water Absorption Mechanical Joint – Transition Fittings Flattening – Pipe Impact Resistance – Pipe & Fittings Workmanship, Finish & Appearance	ASTM F1412, Section 6.1 ASTM F1412, Section 6.2 ASTM F1412, Section 6.3 ASTM F1673, Section 8.3 ASTM F1412, Section 6.4 ASTM F1412, Section 6.5 ASTM F1412, Section 6.8 ASTM F1412, Section 6.9 ASTM F1412, Section 7	F1412: <i>Standard Specification for Polyolefin Pipe and Fittings for Corrosive Waste Drainage Systems</i>  F1673: <i>Standard Specification for Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems</i>
Solvent Cement	F493	F493: <i>Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) Plastic Pipe and Fittings</i>

Table 2: Flammability & Surface Burning Characteristics

Flammability Material Rating <sup>4</sup>	UL 94, V-0	UL 94: <i>Tests for Flammability of Plastic Materials for Parts in Devices and Appliances</i>
Flame & Smoke Rating <sup>5</sup> Pipe Flame Spread: Smoke Developed: Fittings Flame Spread: Smoke Developed:	CAN/ULC S102.2  0 5 – 20  5 – 10 15 - 50	CAN/ULC S102.2: <i>Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials</i>

<sup>1</sup> NFS Standard 14, section 3.44, specification for a special engineered (SE) product.

<sup>2</sup> See attached, *Official NFS Listing Except for Spears® LabWaste™ CPVC Corrosive Waste Drainage System*

<sup>3</sup> Chemical Resistance Certification notes:

Test requirements for validation of system chemical resistance differ between existing ASTM Standards for Polypropylene (PP, ASTM F1412) and for Polyvinylidene Fluoride (PVDF, ASTM F1673) corrosive waste drainage systems since each set of requirements has been tailored to each specific thermoplastic material while covering a broad range of chemicals found in typical applications. Per these ASTM Standards, validation of the system material is based on ASTM D543 test protocol with no more than 10% change in tensile strength and no more than 2% weight change (See also *Table 2: Evaluation of Chemical Resistance*). The NSF-cw S.E. Certification of LabWaste™ CPVC Corrosive Waste Drainage System has been made to the same requirements and likewise tailored for this thermoplastic. The following list specifies concentration by volume tested in the SE and in the other ASTM Standards for corrosive waste end use.

Chemical	NSF SE, CPVC	ASTM F1673, PVDF	ASTM F1412, PP
Acetic Acid	5%	5%	5%
Acetone	5%	5%	100%
Ammonium Hydroxide	10%	10%	10%
Nitric Acid	40%	40%	40%
Sodium Hydroxide	60%	10%	10%
Sulfuric Acid	30%	20%	None
Hydrochloric Acid	40%	20%	None

<sup>4</sup> Rating (V-0) indicates that material will not sustain flame ignition

<sup>5</sup> Flame spread and smoke development ratings based on tests of finished product, pipe and fittings solvent cement welded as assemblies, as opposed to material coupon sample tests.

**Table 3: Additional Evaluation of Chemical Resistance**

In addition to the NSF-cw S.E. Certification of Spears® LabWaste™ CPVC Corrosive Waste Drainage System, the following is an overview of acceptability using ASTM D543 specified Standard Reagents based on industry testing by a variety of material suppliers and producers.

**IMPORTANT NOTE:** ASTM D543 Standard Reagents and concentration percentages are as specified therein for evaluation testing and not independently indicative of limitations to CPVC material, nor do specified Standard Reagents preclude acceptability with other chemicals or concentrations **not** specified in ASTM D543. Actual ASTM Standard Specification validation requirements will vary according to individual material (see footnote 2, Table 1). See also “Chemical Resistance Information”, Spears publication LW-4: *Spears® LabWaste™ CPVC Corrosive Waste Drainage System, Technical Information*, for additional chemical resistance information.

System Conformance Criteria	Applicable Standard & Test Reagents	Standard Title
Chemical Resistance (Maximum Change: Weight < 2% Tensile Strength < 10%)	ASTM D543, Standard Reagents – Acceptable: <sup>1</sup> Acetic Acid, 10% Chromic Acid, 40% Citric Acid, 1% Distilled Water Ethyl Alcohol Heptane Hydrochloric Acid, 10% Hydrochloric Acid, conc. Hydrochloric Acid, 40% Hydrogen Peroxide, 28% Kerosene, No. 2 fuel oil Mineral Oil, white Nitric Acid, 10% Oleic Acid Phenol Solution, 5% Soap Solution, 1% Sodium Carbonate Solution, 2% Sodium Carbonate, 20% Sodium Hydroxide Solution, 1% Sodium Hydroxide, 10% Sodium Hydroxide, 60% Sodium Hypochlorite Solution, 4 – 6% Sulfuric Acid, 3% Sulfuric Acid, 30% Transformer Oil	<b>Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents</b>
	ASTM D543, Standard Reagents – Conditional: <sup>2</sup> Acetic Acid, Glacial Acetone Ammonium Hydroxide Diethyl Ether Dimethyl Formamide Methyl Alcohol	

1 – Acceptable – List of ASTM D543 specified Standard Reagents for which CPVC meets the designated criteria based on industry testing.

2 – Conditional – List of ASTM D543 specified Standard Reagents that are water-soluble. CPVC is suitable for use with the specified reagent in alternative concentrations to those listed in ASTM D543 or when system is flushed with water to minimize exposure time and, in some cases, reduce potentially explosive conditions (as with water soluble solvents).

Submitted: A letter from Underwriters' Laboratories of Canada that demonstrates the comparison of CAN/ULC-S102.2 versus ASTM E84 for Thermoplastic Materials.

Spears® LabWaste™ CPVC Corrosive Waste Drainage System, fittings and pipe materials were tested in accordance with U.L. 94, Test for Flammability of Plastic Materials for Parts in Devices and Appliances. These CPVC materials have a flammability rating of V-0, 5VA and 5VB, the highest rating under this test.

Spears® LabWaste™ CPVC Corrosive Waste Drainage System, fittings and pipe materials were also tested in accordance with ASTM D2863, *Standard Test Method for Measuring The Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastic (Oxygen Index)*.

Spears® LabWaste™ CPVC Corrosive Waste Drainage System, fittings and pipe materials were also tested in accordance with ASTM E1354, *Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*.

Spears® LabWaste™ CPVC Corrosive Waste Drainage System, fittings and pipe materials were also tested in accordance with ASTM D1929, *Standard Test Method for Determining Ignition Temperature of Plastic*.

Additional testing in accordance with a modified UL 723/ASTM E84, prepared by Southwest Research Institute, SwRI® Project No.: 01.10083.01.269d, dated October 4, 2004. The test results were: Flame Spread Index 0, and Smoke Developed Index 30.

### **LIMITATIONS OF APPROVAL**

The IMC limitations below are in accordance with the current **Wisconsin Amended IMC 2000 Code**:

- **Materials Exposed Within Plenums:** The LabWaste™ CPVC Corrosive Waste Drainage Systems shall be allowed for installation in accordance with the requirements of **s. IMC 602.2.1**.
- Installation of the Spears® LabWaste™ Chlorinated Polyvinyl Chloride (CPVC) Drainage Systems for corrosive chemical or acid waste shall be in accordance with this evaluation and the certificate of compliance outlined below:

**SPEARS® MANUFACTURING COMPANY  
CERTIFICATE OF COMPLIANCE  
STANDARDS FOR CHLORINATED POLY (VINYL CHLORIDE)  
LabWaste™ CHEMICAL WASTE DRAINAGE SYSTEMS**

Spears® LabWaste™ Chlorinated Polyvinyl Chloride (CPVC) Drainage Systems for corrosive chemical or acid waste shall be manufactured in the U.S.A. from CPVC Type IV, compound having a Cell Classification 23447 as per ASTM D1784. All system components shall be certified by NFS International for use in corrosive waste drainage systems as a Special Engineered (SF) product and bear the NFS-cw mark. Spears® LabWaste™ CPVC meets the requirements of IAPMO IGC 210 and ICC-ES1214 for CPVC chemical waste systems.

All systems pipe and fittings shall be Schedule 40 CPVC produced to the dimensional requirements of ASTM F1412 and the manufacturer's specifications. All fittings shall be DWV drainage patterns meeting the requirements of ASTM D3311 and the manufacturer's specifications, as applicable.

All pipe shall be CAN/ULC S102.2 Listed for Flame Spread Index and Smoke Development Index of 0/5-20 respectively, with the rating designated on the pipe marking. All pipe markings shall be accompanied by a mustard colored stripe or print string for identification of CPVC chemical waste drainage system. All fittings shall be

CAN/ULC S102.2 listed for Flame Spread Index and Smoke Development Index of 5-10/15-50 respectively, with the rating designated on the original package labeling.

Joining method for pipe and fittings shall be solvent cement welding. Solvent cement shall be special mustard color "one-step" primer less type CPVC cement specially formulated for resistance to corrosive chemicals and manufactured in accordance with ASTM F493.

All pipe, fittings, and cement shall be supplied together as a system, as Spears® LabWaste™ CPVC Corrosive Waste Drainage Systems manufactured by Spears® Manufacturing Company.

This approval will be valid through December 31, 2013, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

**DISCLAIMER**

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: March 4, 2009

By: \_\_\_\_\_

Lee E. Finley, Jr.  
Product & Material Review  
Integrated Services Bureau